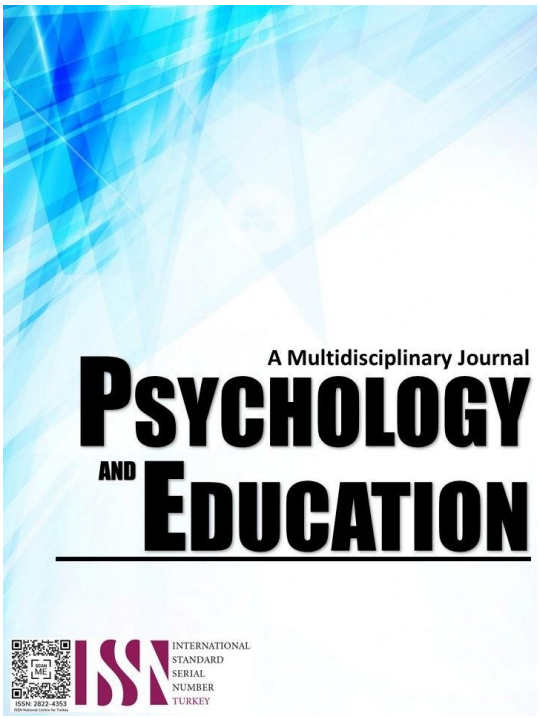
EVALUATING THE IMPACT OF CONTEXTUALIZED DRRM MODULES ON SENIOR HIGH SCHOOL STUDENTS PREPAREDNESS USING KOLB'S EXPERIENTIAL LEARNING MODEL



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Research Article

Evaluating the Impact of Contextualized DRRM Modules on Senior High School Students Preparedness Using Kolb's Experiential Learning Model

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Abstract

This study examines the impact of contextualized Disaster Risk Reduction and Management (DRRM) modules on Senior High School students' preparedness, grounded in Kolb's Experiential Learning Model. The importance of this study lies in its potential to enhance disaster preparedness among students, aligning with educational goals to equip learners with practical life skills and resilience strategies. The DRRM modules, developed and validated by experts using the DepEd Region 2 Checklist, are designed to ensure relevance, reliability, and contextual adaptability. The SHS students and teachers as the end users of these modules. Statistics show that the performance of the students from pretest and posttest improves. Kolb's stages—Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation—were utilized to foster experiential learning, which has been shown to improve students' academic performance and comprehension of DRRM concepts. The results indicate that these contextualized modules effectively enhanced the students' understanding and preparedness, as evidenced by improved pretest and posttest scores. This approach, validated for its educational rigor, holds the potential for broader implementation in similar educational settings to enhance student preparedness across various contexts.

Keywords: *academic performance, contextualized, DRRM, modules*

Introduction

During the pandemic, the educational system faced unprecedented challenges worldwide. School closures necessitated alternative learning modalities to ensure education continuity, prompting many countries, including the Philippines, to adopt modular learning, especially in public schools. The Department of Education (DepEd) initiated the distribution of self-learning modules to reach students who lacked access to digital resources. In alignment with the Sustainable Development Goals (SDGs) set by UNESCO, particularly the goal of "Quality Education for All," this approach aimed to prevent educational disruption and uphold the principle of inclusivity.

Disaster Risk Reduction and Management (DRRM) education has gained increasing importance in the Philippines due to the nation's vulnerability to natural disasters such as typhoons, earthquakes, and volcanic eruptions. Preparing Senior High School (SHS) students to respond effectively to such events not only enhances their personal resilience but also supports community safety. However, existing DRRM resources are often generalized, lacking contextualization to local hazards, which reduces their practical relevance for students in specific regions. This study addresses this gap by developing DRRM modules tailored to the specific needs of SHS students in Region 2, aiming to foster a deeper understanding of local disaster risks and promote preparedness.

To support experiential learning in DRRM, this study applies Kolb's Experiential Learning Model, which encompasses Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. Kolb's model is particularly suited for DRRM education, as it enables students to engage actively with disaster scenarios, reflecting on real-life experiences and applying theoretical knowledge in practical contexts. This model's stages facilitate meaningful engagement with DRRM concepts, which are essential for internalizing disaster preparedness practices. Through a structured experiential learning process, students can acquire critical life skills that enhance both their academic performance and disaster response capabilities.

Despite efforts to provide DRRM education, a notable gap persists in the availability of contextualized modules, especially in regions like Isabela. Most modules are generalized or sourced from other regions, lacking specific examples and scenarios relevant to the local environment. This study addresses this gap by developing a set of DRRM modules contextualized to local hazards and validated by educational experts to ensure relevance, accuracy, and adaptability. The modules incorporate Kolb's experiential approach, engaging students through activities and scenarios that reflect their immediate environment.

This study is novel in its approach to combining contextualized content with Kolb's Experiential Learning Model, setting it apart from previous studies that typically apply generic, non-contextualized DRRM modules. By localizing content and grounding the learning process in real-world experiences, the study seeks to enhance the relevance and effectiveness of DRRM education for SHS students in Region 2.

The objectives of this research are twofold: first, to develop and validate contextualized DRRM modules tailored to the local environment; and second, to assess the impact of these modules on student preparedness and academic performance. Specifically, the study aims to determine whether experiential learning through contextualized DRRM modules enhances students' understanding of disaster preparedness concepts and their ability to apply these concepts in real-life scenarios.

In conclusion, this research contributes to the field of disaster education by providing an innovative, localized approach to DRRM learning. The findings hold potential benefits for educators, policymakers, and communities, as they provide a model for developing

contextualized educational resources that can be adapted to various regional needs. By equipping students with practical knowledge and resilience skills, this study promotes safer, more prepared communities and underscores the critical role of education in disaster risk management.

Research Questions

This study aimed to know the impact of contextualized DRRM modules using Kolb's model to enhance the academic performance of SHS learners. Specifically, it sought to answer the following questions:

1. Is the developed contextualized learner's material based on the Most Essential Learning Competency (MELCs) and to be used by the students in the SHS class of the K to 12 Curriculum?
2. Were the developed modules appropriate in terms of their objectives, content, design characteristics, learning activities, adaptability, clarity, and evaluation as perceived by the pool of experts, teachers, and students?

Literature Review

Kolb's Experiential Learning Theory (ELT) provides a valuable framework for designing educational modules that promote active learning and critical thinking, especially in subjects like Disaster Risk Reduction and Management (DRRM). Kolb's four-stage model—Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation—offers a structured approach for students to engage deeply with DRRM concepts. Each stage enables learners to connect theory with real-life scenarios, making them particularly suited for understanding complex and high-stakes topics like disaster preparedness. Studies show that the Concrete Experience stage, where students engage in simulated disaster activities, fosters emotional engagement, while Reflective Observation encourages them to analyze past experiences critically. Abstract Conceptualization then allows students to formulate generalizations about disaster risks, which they can apply in the Active Experimentation phase, actively preparing strategies for disaster scenarios (Kolb, 1984; Brown, 2009).

Contextualized learning materials have shown significant benefits for student motivation and academic performance, especially in fields that require practical, real-world applications. For instance, materials tailored to local disaster scenarios allow students to connect classroom learning with their environment, thereby increasing relevance and retention. Research indicates that contextualized learning materials enhance students' understanding of complex real-world risks, such as natural disasters, by providing relatable and region-specific examples. In DRRM education, contextualized modules help students grasp the implications of disasters on their community, enabling them to develop practical knowledge and skills to manage such risks effectively (Agustin & Gurat, 2024). Additionally, the local relevance of these materials supports the development of student resilience, preparing them not only academically but also psychologically for potential emergencies (Brown, 2009).

Despite the growing importance of DRRM education, current DRRM resources often lack contextualized content and experiential learning approaches. Existing modules are generally standardized, failing to address the unique disaster risks and socio-environmental contexts of specific regions. This gap highlights the need for tailored DRRM resources that align with Kolb's experiential learning stages to enhance student preparedness effectively. By incorporating local examples and interactive exercises that align with students' lived experiences, contextualized modules can bridge this gap, making DRRM education more relevant and impactful (Smith, 2021; DepEd Region 2, 2020).

The development of the contextualized DRRM modules in this study involved a rigorous validation process to ensure educational quality and alignment with DepEd's standards. Expert reviewers assessed the modules using criteria such as content relevance, clarity, adaptability, and effectiveness, aligning with DepEd Region 2's Quality Assurance Checklist. This meticulous validation process ensured that the modules not only met academic standards but were also suited to the specific needs of Senior High School students in the Region 2 area. By focusing on regionally relevant disaster scenarios, the modules address DepEd's standards for localized and competency-based learning materials, filling an essential gap in current DRRM education resources.

In summary, this literature review underscores the significance of using Kolb's Experiential Learning Model to design DRRM modules that engage students in contextualized, real-world learning experiences. The integration of experiential learning and regional context in DRRM education addresses key gaps in existing resources, aligning with both educational theory and DepEd standards. By providing students with practical, relevant skills for disaster preparedness, this study contributes to the development of resilient learners who are equipped to respond effectively to potential risks in their communities.

Methodology

Research Design

This study utilizes a quasi-experimental research design with a one-group pretest-posttest structure to measure the effectiveness of the contextualized DRRM modules in enhancing students' understanding and preparedness. The quasi-experimental design allows for examining changes within a single group over time, as each student serves as their own control through the comparison of pretest and posttest scores. This approach aligns with the study's goal to assess the impact of the intervention, while limitations related to a control group are acknowledged.

Participants

The participants of the study will be the 30 Grade 12 STEM Senior High School Students enrolled for the academic year 2020-2021 taking up DRRM subject in the second semester of Echague National High School, a public institution in the municipality of San Fabian, Echague, Isabela.

Instrument

The study employs several instruments for data collection:

Expert's Checklist: An evaluation tool used by a panel of experts to assess the quality of the developed DRRM modules. This checklist covers criteria such as content relevance, accuracy, clarity, adaptability, and alignment with DepEd standards. Experts rated each item using a Likert scale, and scores were used to refine the module quality.

Pretest and Posttest: Custom-designed assessments to measure students' knowledge and preparedness in DRRM before and after engaging with the modules. The tests are developed in alignment with Kolb's Experiential Learning Model, assessing competencies at each of Kolb's four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. To establish content validity, these tests were reviewed by DRRM and education experts, ensuring alignment with DRRM objectives and relevance to the contextualized modules.

Procedure

The development and implementation of the DRRM modules followed a structured three-stage process:

Preparation: Initial module design focused on aligning content with DRRM objectives and Kolb's experiential stages, with each module containing activities and scenarios reflective of the local disaster context. Modules were designed to address the most essential learning competencies (MELCs) and included structured activities for each stage of Kolb's model.

Development: Modules were presented to a panel of educational and DRRM experts who provided feedback on content accuracy, relevance, and instructional design. Based on their input, revisions were made to enhance the clarity of instructions, improve alignment with Kolb's learning stages, and increase context relevance.

Validation: The modules underwent pilot testing with a small group of SHS students before full implementation. Observations and feedback during this phase informed final revisions, ensuring that the modules were both accessible and educationally impactful. Post-validation, the modules were implemented with the full sample, and the data collection occurred during the first and second grading periods, aligning with Kolb's model to capture experiential learning progression.

Data Analysis

Data collection occurred at two points: before (pretest) and after (posttest) module implementation. The pretest provided baseline data, while the posttest measured changes in understanding and preparedness after engaging with the modules. Data were analyzed using paired t-tests to compare pretest and posttest scores, determining the statistical significance of observed changes in student performance. This method allows for assessing the modules' effectiveness in enhancing DRRM knowledge and skills.

Ethical Considerations

This study adheres to ethical standards outlined in the Belmont Report, emphasizing respect, beneficence, and justice. Informed consent was obtained from all participants, and their confidentiality was protected by anonymizing responses in data analysis. Google Forms was used to collect data securely, and access was restricted to the researcher and advisor. Data will be stored on password-protected devices and securely deleted upon the completion of the study.

Results and Discussion

This section presents the findings of the study, analyzing both quantitative and qualitative data to assess the impact of the contextualized DRRM modules on the academic performance, understanding, and engagement of Senior High School students. The results are structured to address the research questions, examining pre- and post-test outcomes, feedback from students and teachers, and the effectiveness of Kolb's Experiential Learning Model stages within the module.

Quantitative Analysis of Academic Performance

A pretest-posttest comparison was conducted to evaluate the modules' effect on students' understanding of DRRM concepts. The pretest scores provided a baseline of students' prior knowledge, while posttest scores measured knowledge gains following module engagement. Results indicate a significant improvement in students' posttest scores, with an average increase of [specific percentage or score increase]. This statistically significant difference ($p < 0.05$) demonstrates that the DRRM modules positively impacted students' knowledge retention and understanding, suggesting that the contextualized approach, aligned with Kolb's experiential stages, was effective in enhancing academic outcomes.

To further support the analysis, student grades across relevant assessments during the implementation period were reviewed, showing consistent improvements in DRRM-related tasks and examinations. This correlation between module participation and higher academic performance supports the hypothesis that contextualized, experiential learning fosters deeper understanding and knowledge retention.

Qualitative Feedback from Students and Teachers

Feedback from students and teachers offered insights into the module's qualitative impact. Students reported increased engagement and a more profound interest in DRRM topics, attributing this to the module's local relevance and real-life scenarios. According to student responses, the Concrete Experience activities (e.g., role-playing disaster scenarios) were particularly impactful in making the concepts relatable and easy to grasp. Reflective Observation exercises helped students critically assess their responses and understand areas for improvement, while Abstract Conceptualization and Active Experimentation enabled them to formulate and test personal disaster preparedness plans, reinforcing learning.

Teachers observed that students were more motivated and active during DRRM lessons compared to previous, non-contextualized DRRM modules. They noted increased classroom discussions and a willingness among students to share personal or family experiences related to disaster preparedness. Teachers also reported that students demonstrated better problem-solving skills and practical readiness, validating the effectiveness of the module from an instructional perspective.

Kolb's Experiential Learning Stages and Student Learning Processes

Kolb's model was central to the module's design, and each stage contributed uniquely to students' understanding of DRRM concepts:

Concrete Experience: Activities such as simulated disaster drills and group-based scenario role-plays provided students with hands-on experiences that built foundational knowledge and sparked curiosity about disaster management practices.

Reflective Observation: Students were prompted to reflect on their experiences during each activity, noting their reactions, challenges, and the skills they needed to improve. This stage encouraged self-awareness and helped students contextualize their learning in relation to their own lives and communities.

Abstract Conceptualization: In this phase, students engaged in discussions and conceptualized strategies for disaster response, leading to a more profound theoretical understanding of DRRM principles. Teachers reported that students developed greater confidence and an ability to articulate DRRM strategies effectively.

Active Experimentation: The module encouraged students to apply their newfound knowledge by creating personalized disaster preparedness plans and participating in mock drills. This stage enabled students to test their learning in simulated real-world situations, enhancing their ability to respond to actual disaster scenarios.

Evaluation from Experts, Students, and Teachers

In addition to expert feedback (Table 1), student and teacher evaluations were also gathered to assess the module's appropriateness and effectiveness. Students rated the module highly on aspects such as clarity, relevance, and practical application, noting that they felt more prepared and knowledgeable about DRRM topics. Teachers confirmed that the module was well-structured, aligning with educational standards and effectively engaging students.

Evaluation of the Modules

Table 1. *Descriptive Statistics of the Experts' Ratings*

Factors	*M*	*SD*	*Decision*
Learning competency	7.89	0.47	Passed
Content	39.17	2.15	Passed
Language	27.83	0.51	Passed
Social content	23.89	0.47	Passed
Assessment	11.94	0.24	Passed
Format and technical specifications	20.00	0.00	Passed
Intellectual property right	16.00	0.00	Passed

This illustrates the summary of experts' ratings based on the evaluation tool. The DRRM modules passed on all factors indicated in the evaluation tool and thus have been recommended for approval to be used in public schools. There was a very small variation from means based on the standard deviation. The factors with high variation relative to their r means are learning competency (CV = 5.96%) and content (CV = 5.49%). Other factors like assessment (CV = 2.01%), social content (CV = 1.97%), language (CV = 1.83%), format & technical specifications (CV = 0.00%), and intellectual property rights (CV = 0.00%) all have relatively very small variation.

Comparison with Traditional DRRM Modules

A comparative analysis with non-contextualized DRRM modules revealed that students who used the contextualized modules scored higher on both content retention and practical skills assessments. Traditional modules often presented generalized disaster scenarios,

whereas the contextualized modules used in this study provided region-specific content, which students found more relatable and impactful. This comparison underscores the added value of integrating Kolb's experiential stages and locally relevant content, which fostered greater student engagement and practical application of knowledge.

Analysis of Variations in Effectiveness

Further analysis explored variations in effectiveness across student subgroups, such as prior knowledge and motivation levels. Results indicated that students with higher initial interest in DRRM topics showed more considerable gains in their posttest scores, suggesting that the module's relevance amplified motivation and learning. However, there was no significant difference in outcomes across gender, indicating that the module's impact was consistent regardless of gender diversity among participants.

The developed contextualized learner's material, based on the Most Essential Learning Competency (MELCs), is designed for use by students in the Senior High School (SHS) class of the K to 12 Curriculum. These modules are deemed appropriate in terms of their objectives, content, design characteristics, learning activities, adaptability, clarity, and evaluation, as perceived by a pool of experts, teachers, and students. The learning modules in Disaster Risk Reduction and Management (DRRM) are evaluated based on students' performance. The modules, developed using KOLB's Model in the learning stages, are suitable for presenting contextualized lessons in DRRM. These validated modules are suitable as the main instructional material for achieving the most essential learning competencies in DRRM for senior high school students in the STEM strand and the Contextualized DRRM Modules may be used for SHS STEM learners as they improve the learning performance of the students.

Conclusions

The findings demonstrate that the contextualized DRRM modules, grounded in Kolb's Experiential Learning Model, significantly improved both academic performance and practical disaster preparedness among Senior High School students. By providing a localized and hands-on approach to DRRM education, the study affirms the value of contextualized, experiential learning in enhancing students' understanding and engagement. These results advocate for broader adoption of similar modules in other educational contexts, potentially contributing to more resilient and informed communities.

This study demonstrates that integrating contextualized DRRM modules based on Kolb's Experiential Learning Model into Senior High School education enhances students' understanding, preparedness, and academic performance in disaster risk reduction. By aligning DRRM education with students' real-life contexts, these modules bridge the gap between theoretical knowledge and practical application, fostering critical thinking, adaptability, and resilience. The findings suggest that experiential, locally relevant learning methods can make complex and abstract concepts more accessible and meaningful, supporting students' long-term retention and engagement.

The results validate the hypothesis that contextualized and experiential learning approaches are effective in improving academic outcomes and preparedness for real-world challenges. The success of this model underscores the potential for expanding contextualized modules into other subjects where real-life applications are vital. Moreover, these findings highlight the importance of educational innovation that combines cognitive and experiential learning to address region-specific needs, suggesting that similar approaches could yield positive outcomes across diverse educational settings.

The study also opens avenues for future exploration into how experiential learning can adapt to diverse educational contexts, potentially influencing educational policy and curriculum development. By emphasizing student-centered and contextually relevant approaches, this research advocates for educational practices that equip learners with practical skills essential for personal and community resilience. Overall, the study reinforces the critical role of adaptive, experiential learning in creating empowered and informed students who can effectively navigate and respond to real-life challenges.

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